

SUPPORT FOR THE AMENDMENTS

The present amendment amends claim 9.

Support for the amendment to claim 9 is found at specification page 9, lines 21-25, page 48, lines 5-12 and 24-25, page 49, lines 1-8, page 64, lines 23-25, page 71, Tables 2 and 3.

It is believed that these amendments have not resulted in the introduction of new matter.

### REMARKS

Claims 9 and 12-18 are currently pending in the present application. Claim 9 has been amended by the present amendment.

The rejections of: (1) claims 9 and 12-18 under 35 U.S.C. §§ 102(b) and/or 103(a) as being anticipated and/or obvious over Abe (U.S. Patent 5,218,048); and (2) claims 9 and 12-18 under 35 U.S.C. §§ 102(b) and/or 103(a) as being anticipated and/or obvious over Iwata (U.S. Patent 5,430,080), are respectfully traversed in part and obviated by amendment in part, with respect to claims 9 and 12-18.

Amended claim 9 recites a thermoplastic resin composition ***consisting of***: 70-90 % by mass of an olefin polymer (1A) comprising olefin having 3 carbon atoms as main units; and 10-30 % by mass of a higher  $\alpha$ -olefin polymer (3) comprising 80-100 mol % of an  $\alpha$ -olefin having 10 or more carbon atoms, wherein the higher  $\alpha$ -olefin polymer (3) has a ***stereoregularity index M2 of 50-85 mol %*** and a ***single melting point ( $T_m$ ) of 0°C to 100°C***.

As discussed in the present specification and shown by the comparative experimental presented therein, Applicants have discovered that the thermoplastic resin composition of the present invention exhibits an excellent balance of rigidity and mechanical strength, increased film impact resistance and improved miscibility between the higher  $\alpha$ -olefin polymer and the thermoplastic resin, without a deterioration in heat resistance and workability (See e.g., Examples 1, 5 and 6 and Comparative Examples 1 and 2).

According to the Table 3 of the present specification, the compositions of Examples 1, 5 and 6 only containing 30 % by mass of the higher  $\alpha$ -olefin polymer show that the miscibility of R is 1.16 (Ex. 1), 1.35 (Ex. 5) and 1.17 (Ex. 6), and the film impact strength is 7.0 (Ex. 1) (kJ/M), whereas the compositions of Comparative Example 1, which contains neither an elastomer nor the higher  $\alpha$ -olefin polymer, and Comparative Example 2, which contains 30.0 % by mass of an

elastomer but does not contain the higher  $\alpha$ -olefin polymer, exhibit miscibility of 1.00 and 1.14, respectively, and film impact strength of 2.4 and 3.8 (kJ/M), respectively.

With respect to the rejection of claims 9 and 12-18 under 35 U.S.C. §§ 102(b) and/or 103(a) as being anticipated and/or obvious over Abe, Abe discloses polyolefin resins composed of homopolymers and copolymers of olefins such as  $\alpha$ -olefins exemplified by ethylene, propylene, butene-1, pentene-1, hexene-1, 3-methylbutene-1, 4-methylpentene-1, octene-1, decene-1, dodecene-1, tetradecene-1, hexadecene-1, octadecene-1, eicosene-1 (See e.g., column 3, lines 20-29).

Abe further discloses that among the polyolefins mentioned above, copolymers containing 50 % by weight or more of ethylene, propylene, butene-1, 3-methylbutene-1 or 4-methylpentene-1, and homopolymers of these monomers are preferable, and that crystalline propylene type polymers such as propylene homopolymer, propylene-ethylene block or random copolymer and the like are more preferable (See e.g., column 3, lines 48 to 54).

Abe also discloses the use of other thermoplastic resins, such as polyphenylene ether resin, polyarylene sulfide resin, polysulfone resin, polyketone resin, polyester resin, polycarbonate resin and the like, in addition to the polyolefin resin (See e.g., the paragraph bridging column 3 to column 4).

However, Abe does not disclose or suggest a thermoplastic resin composition consisting of: 70-90 % by mass of propylene polymer (1A); and 10-30 % by mass of a higher  $\alpha$ -olefin polymer (3) comprising 80-100 mol % of an  $\alpha$ -olefin having 10 or more carbon atoms, wherein the higher  $\alpha$ -olefin polymer (3) has a stereoregularity index M2 of 50-85 mol % and a single melting point ( $T_m$ ) of 0°C to 100°C, as presently claimed.

Abe fails to disclose, suggest or exemplify a thermoplastic resin composition consisting of a blend of a large quantity of a propylene polymer (1A) and a small quantity of a higher  $\alpha$ -olefin polymer (3) comprising 80-100 mol % of an  $\alpha$ -olefin 10 or more carbon atoms, wherein the higher

$\alpha$ -olefin polymer (3) has a stereoregularity index M2 of 50-85 mol % and a single melting point ( $T_m$ ) of 0°C to 100°C.

Abe fails to disclose or suggest why the specific mixture of a propylene polymer (1A) and a higher  $\alpha$ -olefin polymer (3) should be chosen or that any improvement could be achieved by mixing them. The description provided at column 3, lines 20 to 26 of Abe merely enumerate conceivable  $\alpha$ -olefin monomers. Abe fails to disclose or suggest that the higher  $\alpha$ -olefin polymer must be used to produce the composition described therein.

As discussed in greater detail hereinbelow, Abe further fails to disclose or suggest a higher  $\alpha$ -olefin polymer (3) having a stereoregularity index M2 of 50-85 mol % and single melting point ( $T_m$ ) of 0-100°C.

Abe does not disclose or suggest that the higher  $\alpha$ -olefin polymer (3) having the above characteristics is non-tacky at ordinary temperatures and excellent in storage stability and secondary workability, and can be uniformly melted at a low temperature to be excellent in workability. Abe also do not disclose or suggest that by using a specific amount of such a higher  $\alpha$ -olefin polymer (3), a thermoplastic resin composition having excellent mechanical properties including high elastic modulus and impact strength without impairing excellent heat resistance and mold workability, is obtained.

As discussed in the present specification, the higher  $\alpha$ -olefin polymer (3) of the present invention having the above-identified characteristics is non-tacky at ordinary temperatures, excellent in storage stability and secondary workability, and can be uniformly melted at a low temperature to be excellent in workability (See e.g., page 15, lines 21 to 25). Applicants have discovered that by using a specific quantity of the higher  $\alpha$ -olefin polymer (3), a thermoplastic resin composition in accordance with the present invention having excellent mechanical properties including high elastic modulus and impact strength, without impairing excellent heat resistance and mold workability, is obtained (See e.g., page 72, lines 2-6).

Abe fails to recognize that such advantages may be achieved.

Abe clearly fails to disclose or suggest the claimed invention. As a result, the claimed invention is neither anticipated nor rendered obvious by Abe.

With respect to the rejection of claims 9 and 12-18 under 35 U.S.C. §§ 102(b) and/or 103(a) as being anticipated and/or obvious over Iwata, Iwata discloses a flame-retardant thermoplastic resin composition comprising:

- (A) 10-40 % by weight of a melamine coated ammonium polyphosphate having melamine coated on particle surfaces of a powdery ammonium polyphosphate expressed by the formula (I),
- (B) 1-20 % by weight of triazine-containing polymer, and
- (C) 89-40 % by weight of a thermoplastic resin, the total amount of these components being 100 % by weight (See e.g., abstract).

Iwata also discloses that preferred examples of the thermoplastic resin of component (C) include one or more resins selected from the group consisting of a polyethylene resin, polypropylene resin, poly(1-butene) resin, poly(4-methyl-1-pentene) resin, poly(1-hexene) resin, poly(1-octene) resin and poly(1-decene) resin, a mixture of two or more of these resins, polystyrene, an acrylonitrile-butadiene-styrene copolymer (ABS resin), and an acrylonitrile-styrene copolymer (AS resin) (See e.g., column 6, line 65 to column 7, line 5).

Iwata further discloses that a preferred polypropylene resin is crystalline propylene homopolymer, a crystalline copolymer of propylene as main component with at least one monomer selected from the group consisting of ethylene, butane-1, pentene-1, hexene-1, 4-methylpentene-1, heptene-1, octene-1 and decene-1, or a mixture of two or more of these polymers.

However, Iwata does not disclose or suggest how much propylene polymer and higher  $\alpha$ -olefin polymer (3) should be used as a component (C) of the thermoplastic resin described therein.

Iwata fails to provide examples of a thermoplastic resin composition using a specific amount of a propylene polymer and a higher  $\alpha$ -olefin polymer (3) containing 80-100 mol % of an  $\alpha$ -olefin having 10 or more carbon atoms.

Iwata fails to disclose or suggest why the specific mixture of a propylene polymer (1A) and a higher  $\alpha$ -olefin polymer (3) should be chosen or that any improvement could be achieved by mixing them. The description provided at column 6, line 65 to column 7, line 5 of Iwata merely enumerate conceivable thermoplastic resins. Iwata fails to disclose or suggest that the higher  $\alpha$ -olefin polymer must be used to produce the composition described therein.

Iwata exemplifies:

70.5 % by weight of a crystalline propylene-ethylene block copolymer in Examples 1 to 4,  
55.5 % by weight of a crystalline propylene-ethylene block copolymer, 10 % by weight of polyethylene and 10 % by weight of ethylene-propylene rubber in Examples 5 to 8, and  
66.5 % by weight of low-density polyethylene in Examples 9 and 10.

That is, a crystalline propylene-ethylene block copolymer, a mixture of a crystalline propylene-ethylene block copolymer, polyethylene and ethylene-propylene rubber, and low-density polyethylene are the only exemplified thermoplastic resins of Iwata.

Iwata fails to disclose or suggest that the higher  $\alpha$ -olefin polymer (3) containing 80-100 mol % of an  $\alpha$ -olefin having 10 or more carbon atoms must be used to produce the flame retardant thermoplastic resin composition.

As discussed in greater detail hereinbelow, Iwata further fails to disclose or suggest the higher  $\alpha$ -olefin polymer (3) having a stereoregularity index M2 of 50 mol% or more and one melting point ( $T_m$ ) of 0 to 100°C.

Iwata does not disclose or suggest that the higher  $\alpha$ -olefin polymer (3) having the above characteristics is non-tacky at ordinary temperatures and excellent in storage stability and secondary workability, and can be uniformly melted at a low temperature to be excellent in

workability. Iwata also do not disclose or suggest that by using a specific amount of such a higher  $\alpha$ -olefin polymer (3), a thermoplastic resin composition having excellent mechanical properties including high elastic modulus and impact strength without impairing excellent heat resistance and mold workability, is obtained.

As discussed in the present specification, the higher  $\alpha$ -olefin polymer (3) of the present invention having the above-identified characteristics is non-tacky at ordinary temperatures, excellent in storage stability and secondary workability, and can be uniformly melted at a low temperature to be excellent in workability (See e.g., page 15, lines 21 to 25). Applicants have discovered that by using a specific quantity of the higher  $\alpha$ -olefin polymer (3), a thermoplastic resin composition in accordance with the present invention having excellent mechanical properties including high elastic modulus and impact strength, without impairing excellent heat resistance and mold workability, is obtained (See e.g., page 72, lines 2-6).

Iwata fails to recognize that such advantages may be achieved.

Iwata clearly fails to disclose or suggest the claimed invention. As a result, the claimed invention is neither anticipated nor rendered obvious by Iwata.

Applicants respectfully submit that the Examiner has failed to meet the burden of establishing a *prima facie* case of anticipation and/or obviousness with respect to the claim limitations of the higher  $\alpha$ -olefin polymer having a stereoregularity index M2 of 50-85 mol % and a single melting point ( $T_m$ ) of 0-100°C.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Bros. v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). When a claim limitation is not explicitly set forth in a reference, evidence must make clear that the missing descriptive matter is necessarily present in the reference and that it would be so recognized by skilled artisans. *In re Omeprazole Patent Litigation*, 82 USPQ2d 1643 (Fed. Cir. 2007). The fact that a certain result or

characteristic may occur or be present in the reference is not sufficient to establish inherency of that result or characteristic. *In re Rijckaert*, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993). It is not sufficient if a material element or limitation is merely probably or possibly present in the reference. *Trintec Indus., Inc. v. Top-U.S.A. Corp.*, 63 USPQ 1597 (Fed. Cir. 2002) and *In re Robertson*, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999). To anticipate, the asserted inherent element must necessarily be present in the reference. *SmithKline Beecham Corp. v. Apotex Corp.*, 74 USPQ2d 1398 (Fed. Cir. 2005) and *In re Oelrich*, 212 USPQ 323, 326 (CCPA 1981). Anticipation cannot be predicated on mere conjecture respecting the characteristics of products that might result from the practice of processes described in cited references. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 220 USPQ 303, 314 (Fed. Cir. 1983).

Abe and Iwata, when considered alone or in combination, fail to disclose or suggest that the  $\alpha$ -olefin polymers described therein have a stereoregularity index M2 of 50-85 mol % and a single melting point ( $T_m$ ) of 0°C to 100°C.

Applicants have discovered that the claimed higher  $\alpha$ -olefin polymer having a stereoregularity index M2 of 50-85 mol % and a single melting point ( $T_m$ ) of 0°C to 100°C may be produced with a polymerization metallocene catalyst represented by the general formulae (I) and (II) (See e.g., page 6, lines 8-13 and 18, page 16, lines 1-11 and 16, page 20, lines 21-25, page 21, line 1, claims 16 and 17).

Applicants respectfully submit that unlike the  $\alpha$ -olefin polymers produced by the conventional processes of Abe and Iwata, the process of producing the claimed higher  $\alpha$ -olefin polymer with a polymerization metallocene catalyst represented by the general formulae (I) and (II) in accordance with an exemplary aspect of the present invention imparts distinct properties to the claimed higher  $\alpha$ -olefin polymer with respect to a stereoregularity index M2 of 50-85 mol % and a single melting point ( $T_m$ ) of 0°C to 100°C. See e.g., MPEP § 2113 and *In re Garnero*, 162 USPQ 221, 223 (CCPA 1979).



In contrast, Abe and Iwata fail to disclose or suggest that the  $\alpha$ -olefin polymers described therein are produced with the polymerization metallocene catalyst represented by the general formulae (I) and (II). Accordingly, there is no reasonable basis for a skilled artisan to conclude that the  $\alpha$ -olefin polymers described in Abe and Iwata would inherently or intrinsically have a stereoregularity index M2 of 50-85 mol % and a single melting point ( $T_m$ ) of 0°C to 100°C, as claimed in claim 9.

The mere possibility that the  $\alpha$ -olefin polymers described therein may possibly have a stereoregularity index M2 of 50-85 mol % and a single melting point ( $T_m$ ) of 0°C to 100°C, as presently claimed, is an insufficient ground for arriving at a supportable conclusion of anticipation or obviousness. No evidence has been proffered by the Office establishing that the  $\alpha$ -olefin polymers described in Abe and Iwata inherently or intrinsically have a stereoregularity index M2 of 50-85 mol % and a single melting point ( $T_m$ ) of 0°C to 100°C, as presently claimed. Therefore, the conclusion in the Official Action that the  $\alpha$ -olefin polymers described of Abe and Iwata inherently or intrinsically have a stereoregularity index M2 of 50-85 mol % and a single melting point ( $T_m$ ) of 0°C to 100°C constitutes “official notice” that is not only unsupported by documentary evidence, but also in direct contradiction to the evidence already of record.

As a result, Abe and Iwata, when considered alone or in combination, fail to anticipate or render obvious the thermoplastic resin composition of the present invention comprising the claimed higher  $\alpha$ -olefin polymer having a stereoregularity index M2 of 50-85 mol % and a single melting point ( $T_m$ ) of 0°C to 100°C.

Assuming *arguendo* that sufficient motivation and guidance is considered to have been provided by Abe and/or Iwata to direct a skilled artisan to incorporate into the thermoplastic resin compositions described therein the claimed higher  $\alpha$ -olefin polymer having a stereoregularity index M2 of 50-85 mol % and a single melting point ( $T_m$ ) of 0°C to 100°C, which is clearly not the case,

such a case of obviousness is rebutted by a showing of superior properties and secondary considerations.

As discussed in the present specification, traditional thermoplastic resin compositions comprising higher  $\alpha$ -olefin polymers polymerized using conventional Ziegler-Natta catalysts suffer from inferior properties with respect to decreased film impact resistance and reduced miscibility between the higher  $\alpha$ -olefin polymers and the thermoplastic resins (See e.g., page 2, lines 16-25, page 3, lines 1-17, page 4, lines 4-10). Accordingly, there has been a long-felt need to provide a thermoplastic resin composition comprising a higher  $\alpha$ -olefin polymer that exhibits increased film impact strength and improved miscibility between the higher  $\alpha$ -olefin polymer and the thermoplastic resin. Based on the limited disclosures of Abe and Iwata, and the traditional thermoplastic resin compositions described therein, other skilled artisans have failed to discover a solution to this long-felt need.

As shown in Tables 1 and 2 below, which compile into tabular form the comparative experimental data presented in the previously submitted 37 C.F.R. § 1.132 Declaration, Applicants have discovered that a thermoplastic resin composition comprising a higher  $\alpha$ -olefin polymer polymerized using a metallocene catalyst and having a stereoregularity index M2 of 50-85 mol % and a single melting point ( $T_m$ ) of 0°C to 100°C in accordance with the present invention exhibits superior properties with respect to increased film impact resistance and improved miscibility between the higher  $\alpha$ -olefin polymer and the thermoplastic resin.

Table 1

	Higher $\alpha$ -Olefin Polymer	Catalyst	Stereoregularity Index M2 (mole %)	Melting Point(s) (°C)
Ex. 3	Polymer (1)	Metallocene	60.4	41.5
Ex. 4	Polymer (2)	Metallocene	50.8	40
Comp. Ex. 3	Polymer (3)	Ziegler-Natta	91.8	36.9 and 68.1
Comp. Ex. 4	Polymer (4)	Ziegler-Natta	87.2	35.1 and 66.1

The higher  $\alpha$ -olefin polymer (1) of Example 3, which was polymerized using a metallocene catalyst, has a stereoregularity index M2 of 60.4 mole % and a single melting point ( $T_m$ ) of 41.5°C in accordance with the claimed higher  $\alpha$ -olefin polymer of the present invention. The higher  $\alpha$ -olefin polymer (2) of Example 4, which was polymerized using a metallocene catalyst, has a stereoregularity index M2 of 50.8 mole % and a single melting point ( $T_m$ ) of 40°C in accordance with the claimed higher  $\alpha$ -olefin polymer of the present invention.

Unlike the claimed higher  $\alpha$ -olefin polymer of the present invention, the higher  $\alpha$ -olefin polymer (3) of Comparative Example 3, which was polymerized using a conventional Ziegler-Natta catalyst, has a stereoregularity index M2 of 91.8 mole % and two melting points ( $T_m$ ) of 36.9°C and 68.1°C. Unlike the claimed higher  $\alpha$ -olefin polymer of the present invention, the higher  $\alpha$ -olefin polymer (4) of Comparative Example 4, which was polymerized using a conventional Ziegler-Natta catalyst, has a stereoregularity index M2 of 87.2 mole % and two melting points ( $T_m$ ) of 35.1°C and 66.1°C.

Table 2	Thermoplastic Resin		Higher $\alpha$ -Olefin Polymer		Miscibility (R)	Film Impact Strength (kJ/M)
	Type	wt. %	Type	wt. %		
Ex. 3	Polypropylene	70.0	Polymer (1)	30.0	1.14	6.9
Ex. 4	Polypropylene	70.0	Polymer (2)	30.0	1.15	6.8
Comp. Ex. 3	Polypropylene	70.0	Polymer (3)	30.0	1.06	2.8
Comp. Ex. 4	Polypropylene	70.0	Polymer (4)	30.0	1.07	2.6

As shown by the comparative experimental data presented in Table 2, the thermoplastic resin compositions comprising the higher  $\alpha$ -olefin polymer (1) of Example 3 and the higher  $\alpha$ -olefin polymer (2) of Example 4, which were polymerized using a metallocene catalyst and have a stereoregularity index M2 and a single melting point in accordance with the claimed higher  $\alpha$ -olefin polymer of the present invention, exhibit superior properties with respect to increased film impact resistance and improved miscibility between the higher  $\alpha$ -olefin polymer and the thermoplastic resin, as compared to the inferior properties exhibited by the traditional thermoplastic resin

compositions comprising the higher  $\alpha$ -olefin polymer (3) of Comparative Example 3 and the higher  $\alpha$ -olefin polymer (4) of Comparative Example 4, which were polymerized using a conventional Ziegler-Natta catalyst and have two melting points.

This evidence clearly demonstrates that a thermoplastic resin composition comprising a higher  $\alpha$ -olefin polymer polymerized using a metallocene catalyst and having a stereoregularity index M2 and a single melting point in accordance with the claimed higher  $\alpha$ -olefin polymer of the present invention exhibits superior properties with respect to increased film impact resistance and improved miscibility between the higher  $\alpha$ -olefin polymer and the thermoplastic resin, as compared to the inferior properties exhibited by a traditional thermoplastic resin composition comprising a higher  $\alpha$ -olefin polymer polymerized using a conventional Ziegler-Natta catalyst and having two melting points.

The Examiner has dismissed the comparative experimental data presented in the previously submitted 37 C.F.R. § 1.132 Declaration because the Examiner is of the opinion that a direct comparison has not been made between the thermoplastic resins of Abe and Iwata and the thermoplastic resin composition of the present invention comprising the claimed higher  $\alpha$ -olefin polymer.

Abe and Iwata are completely silent as to what particular catalysts are used for producing the  $\alpha$ -olefin polymers described therein. As a result, it is impossible to carry out a direct comparison between the claimed higher  $\alpha$ -olefin polymers of the present invention and the  $\alpha$ -olefin polymers of Abe and Iwata, as required by the Examiner, due to the limited disclosures of these cited references.

Based on established U.S. case law, as recited in MPEP § 716.02(e), Applicants may compare the claimed invention with prior art that is more closely related to the invention than the prior art relied upon by the examiner. See e.g., *In re Holladay*, 199 USPQ 516 (CCPA 1978); and *Ex parte Humber*, 217 USPQ 265 (Bd. App. 1961).

Accordingly, the  $\alpha$ -olefin polymers of Comparative Examples 3 and 4, which were produced with a conventional Ziegler-Natta catalyst, as set forth in the previously submitted § 1.132 Declaration, provide a closer comparison to the higher  $\alpha$ -olefin polymers of Examples 3 and 4, which were produced with a polymerization metallocene catalyst in accordance with the present invention, than the  $\alpha$ -olefin polymers disclosed in Abe and Iwata, which are completely silent as to what particular catalysts are used for producing the same.

Withdrawal of these grounds of rejection is respectfully requested.

In conclusion, Applicants submit that the present application is now in condition for allowance and notification to this effect is earnestly solicited.

Respectfully submitted,

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